

**UNION SWITCH AND SIGNAL
ELECTROPLATING BUILDING
ADDITIONAL SUBSURFACE SOIL ANALYSIS REPORT
SWISSVALE, PENNSYLVANIA PLANT**

PREPARED FOR:

**UNION SWITCH AND SIGNAL
SWISSVALE, PENNSYLVANIA**

PREPARED BY:

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PROJECT NO. 305259**

INTRODUCTION

Initial investigations conducted by IT Corporation (IT) in September 1986 at the Electroplating Building, Union Switch and Signal (USS), Swissvale, Pennsylvania showed the presence of heavy metals and cyanide at the site. The heavy metals identified were those typically present in the electroplating operations and included cadmium, copper, chromium, and nickel. Core sampling conducted within the building indicated the presence of the metals described above in several subsurface samples.

On August 14, 1987, USS contracted IT to conduct additional investigation to determine the soil condition under the electroplating building. The building contained several electroplating tanks, storage areas, and a network of underground piping which carried waste waters to the RWTF for pretreatment. IT mobilized a sampling crew on August 14, 1987 and collected 24 subsurface soil samples. This report presents results of our findings.

SAMPLING PLAN

A sampling plan was designed and implemented by IT to provide USS with soil assessment data in horizontal and vertical directions beneath the electroplating building floor. (Figure 1, Table 1). Accordingly, the samples were collected at two different depths that included:

- Ten samples collected at two-foot depths at various locations such as electroplating tanks and storage areas
- Fourteen samples collected at seven-foot depths in the vicinity of the underground duct network.

Following the removal of bricks from the building floor, the exposed concrete surface was drilled with a six-inch diamond core bit to gain access to the subsurface soil. Concrete thickness encountered during drilling was 12 inches instead of the assumed 10 inches. This made drilling difficult, however, once the concrete core was removed, a hand auger was used to collect the subsurface soil samples. The samples were thoroughly homogenized at site and placed in to widemouth amber-colored glass bottles with teflon lids. Sampling equipment was decontaminated by washing with distilled water to avoid cross

contamination between samples.

The samples were transported to IT's analytical laboratory located at Export, Pennsylvania for analyses. Chain-of-custody records followed the sample shipment.

ANALYTICAL PROGRAM

The analytical program for the soil samples collected followed the U.S. Environmental Protection Agency (U.S. EPA) methods outlined in the "Test Methods for Evaluating Solid Wastes," SW-846, 3rd revised edition, 1986. For samples not subject to the aforementioned U.S. EPA Reference SW-846, other methods used were either approved by the U.S. EPA or Standard Methods by American Public Health Association, 16th edition, 1985. A summary of analytical methods are presented in Table 2. The analytical program included:

- Total metal analysis for applicable heavy metals
- EP toxicity analysis for applicable heavy metals
- Total and leachable cyanide.

Standard IT quality assurance/quality control (QA/QC) program was followed for the analytical program. The program consisted of analyses of blanks, duplicate, and spikes with samples analyses.

ANALYTICAL RESULTS

Table 3 through 6 presents the analytical data for the samples collected from the plating operations building. Total aluminum concentrations ranged from 4,600 ppm to 13,000 ppm in two-foot and seven-foot depth samples (Table 3). Other metals were low in subsurface soil collected at two-foot depths, except for the sample (USS-4). This sample showed elevated cadmium (530 mg/kg), chromium (810 mg/kg), copper (1,600 mg/kg), and nickel (760 mg/kg) as compared to other samples (Table 3).

Total metal concentrations in subsurface soil samples collected at seven-foot depths were low; however, lead was detected in Sample USS-11 (860 mg/kg), USS-16 (2,000 mg/kg) and USS-23 (1,200 mg/kg) (Table 3). Sample USS-23 showed total cadmium concentrations of 400 mg/kg (Table 3).

Results for the Resource Conservation and Recovery Act (RCRA), Extraction Procedure (EP) toxicity leachate analysis (40 Code of Federal Regulations [CFR] 260.20 and 260.21) performed for metals in the soil samples are presented in Table 4 and 5. Samples generally showed EP toxicity metals below EP TOX guidelines except Sample USS-4, which was slightly elevated in leachable cadmium [4.3 milligrams per liter (mg/l)].

All the soil samples collected at seven-foot depths were within U.S. EPA guidelines for EP toxicity metals.

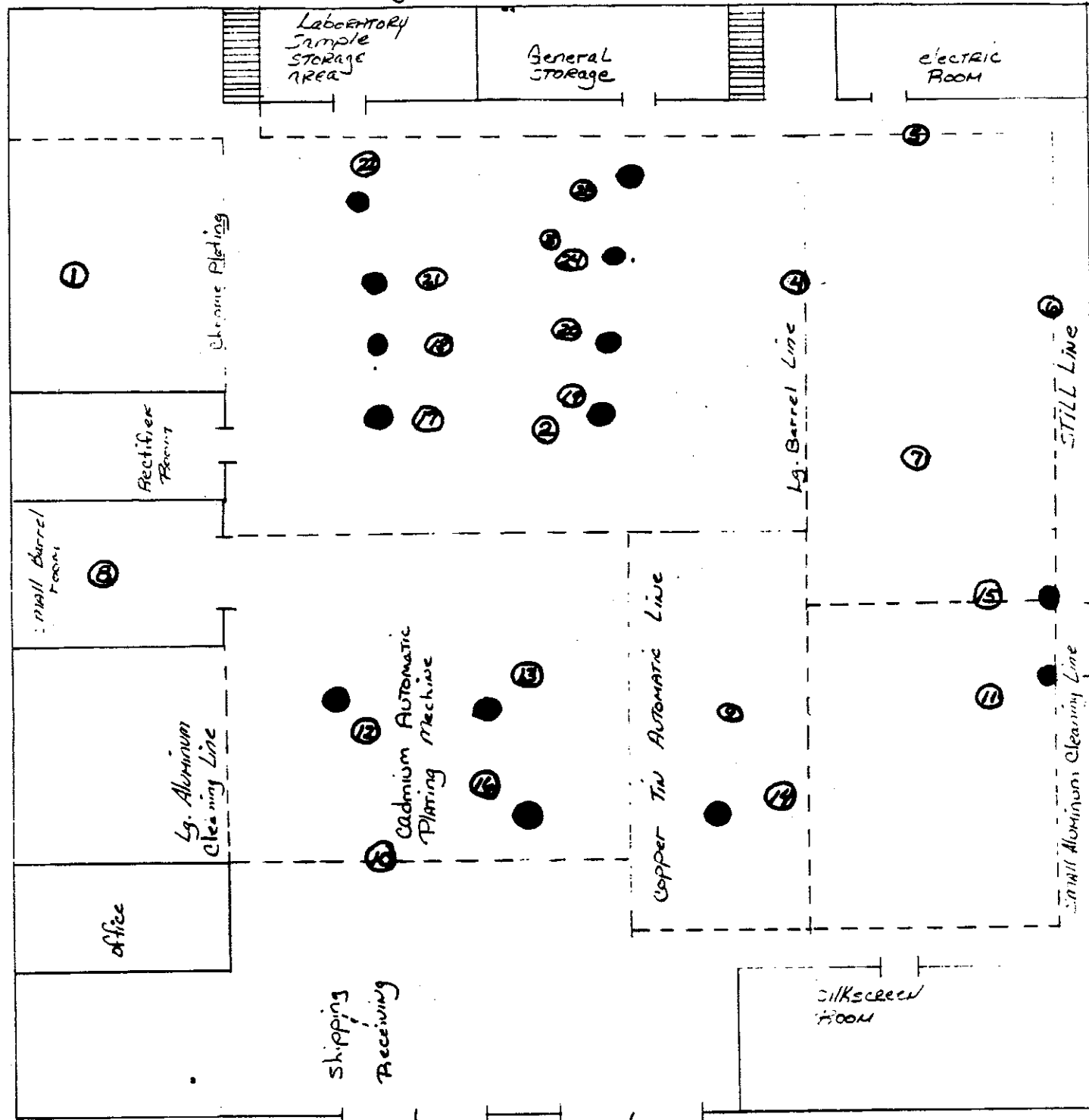
Table 6 presents the results of total and leachable cyanides. Soil samples collected at two-foot depths showed total cyanide concentrations ranging from 1.7 mg/kg to 7.4 mg/kg, except below detection (<0.5 mg/kg) in Sample USS-10.

Soil samples collected at seven-foot depths showed total detectable cyanide concentrations at various locations ranging from 0.8 mg/kg to 4.6 mg/kg. Total cyanide was below detection (<0.5 mg/kg) in samples (USS-12 and USS-13) (Table 6).

SUMMARY

The subsurface soil samples collected from the plating operations building at the USS plant located in Swissvale, Pennsylvania generally showed low total concentrations of metals typically used in the electroplating operations. Based on the presence of acid brick, mastic and 12 to 17 inches of concrete beneath the electroplating building, those results are consistent with what should of been expected. Among the ten samples collected at two-foot depths, only one sample showed the elevated metals concentrations. This sample (USS #4) was also the only sample which exceeded the EP TOX guidelines. All other samples were below U.S. EPA EP TOX threshold levels.

By _____ Date _____ Subject Union Switch & Signal Sheet No. _____ of _____
Chkd. By _____ Date _____ con. coring / soil sampling locations @ Proj. No. 30525
Building 8.



- = Underground duct entry
 - ① = samples collected 2' below grade DOORS
 - ② = samples collected 7' below grade
- NOT TO SCALE

FIG-1.

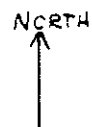


TABLE 1
 APPROXIMATE SUBSURFACE SAMPLING LOCATIONS(a)
 PLATING OPERATIONS BUILDING
 UNION SWITCH AND SIGNAL
 SWISSVALE, PENNSYLVANIA

SAMPLE I.D.	SAMPLE DEPTH FROM EXISTING SURFACE (FEET)	APPROXIMATE SAMPLING LOCATION
USS-1	2	Chrome plating area
USS-2	2	Large barrel line area
USS-3	2	Large barrel line area
USS-4	2	Large barrel line area/still area
USS-5	2	Still line area/front electric room
USS-6	2	Still line area
USS-7	2	Still line area
USS-8	2	Small barrel room area
USS-9	2	Copper-tin automatic line area
USS-10	2	Cadmium automatic plating machine area
USS-11	7(b)	Small aluminum cleaning line
USS-12	7	Cadmium automatic plating machine area
USS-13	7	Cadmium automatic plating machine area
USS-14	7	Copper-tin automatic line area
USS-15	7	Still line/small aluminum cleaning area
USS-16	7	Cadmium automatic plating machine area
USS-17	7	Large barrel line area
USS-18	7	Large barrel line area
USS-19	7	Large barrel line area
USS-20	7	Large barrel line area
USS-21	7	Large barrel line area
USS-22	7	Large barrel line area
USS-23	7	Large barrel line area
USS-24	7	Large barrel line area

(a)Refer to Figure 1 for approximate sampling location.

(b)Seven-foot depth samples were collected close to underground duct entry areas.

TABLE 2

ANALYTICAL METHODS REFERENCE SUMMARY
 SUBSURFACE SOIL SAMPLES
 PLATING OPERATIONS BUILDING
 UNION SWITCH AND SIGNAL
 SWISSVALE, PENNSYLVANIA

METHOD TITLE	REFERENCE
Inductively Coupled Plasma-Atomic Emissions Spectrometric Method for Trace Element Analysis of Water and Waste	Method 200.7, <u>Methods for the Chemical Analysis of Water and Waste</u> , United States Environmental Protection Agency - 600/4-79-020, 1983 Revision.
Arsenic (Atomic Absorption, Furnace Technique)	Method 206.2, <u>Methods for the Chemical Analysis of Water and Waste</u> , United States Environmental Protection Agency - 600/4-79-020, 1983 Revision.
Mercury (Manual Cold Vapor Technique)	Method 245.1, <u>Methods for the Chemical Analysis of Water and Waste</u> , United States Environmental Protection Agency - 600/4-79-020, 1983 Revision.
Chromium (Hexavalent)	Method 312B, <u>Standard Methods for the Examination of Water and Wastewater</u> , American Public Health Association, 16th Ed., 1985.
Cyanide, Total (Titrimetric, Spectrophotometric)	Method 335.2, <u>Methods for the Chemical Analysis of Water and Waste</u> , United States Environmental Protection Agency - 600/4-79-020, 1983 Revision.
Extraction Procedure (EP) Toxicity Test Method and Structural Integrity Test	Method 1310, <u>Test Methods for Evaluating Solid Waste</u> , U.S. EPA SW-846 3rd Ed., 1986.
Acid Digestion of Aqueous Samples and Extracts for Total Metals for Analysis by FLAA or ICP- Spectroscopy	Method 3010, <u>Test Methods for Evaluating Solid Waste</u> , U.S. EPA SW-846 3rd Ed., 1986.
Acid Digestion of Aqueous Samples and Extracts for Total Metals for Analysis by Furnace Atomic Absorption Spectroscopy	Method 3020, <u>Test Methods for Evaluating Solid Waste</u> , U.S. EPA SW-846 3rd Ed., 1986.

TABLE 2
(Continued)

METHOD TITLE	REFERENCE
Mercury, Manual Cold Vapor	Method 7040, <u>Test Methods for Evaluating Solid Waste</u> , U.S. EPA SW-846 3rd Ed., 1986.
Total and Amenable Cyanide (Colorimetric Method)	Method 9010, <u>Test Methods for Evaluating Solid Waste</u> , U.S. EPA SW-846 3rd Ed., 1986.

TABLE 3

TOTAL METAL AND MOISTURE ANALYSIS SUMMARY
SUBSURFACE SOIL SAMPLES(a)
PLATING OPERATIONS BUILDING
UNION SWITCH AND SIGNAL
SWISSVALE, PENNSYLVANIA

SAMPLE I.D.	ALUMINUM	ARSENIC	ANALYTICAL PARAMETER (UNITS mg/kg)(b)					LEAD	MERCURY	NICKEL	MOISTURE (%)
			CADMIUM	CHROMIUM (HEXVALENT)	CHROMIUM (TOTAL)	COPPER					
USS-1	11,000/9,500	<1.5(c)	0.4/0.4(d)	<2.0	45/53	20/22	19	<0.2	20/22	15.8/16.7	
USS-2	11,000	8.8	1.7	<9.9	52	46	44	<0.2	57	21.9	
USS-3	10,000	8.1	7.6	<5.0	20	73	22	<0.2	20	17.6	
USS-4	11,000	7.5	530	<5.0	810	1,600	44	<0.2	760	25	
USS-5	9,700	5.9	8.5	<5.0	62	200	31	<0.2	26	19.2	
USS-6	9,700	3.9	14	<1.0	22	35	17	<0.2	18	19.5	
USS-7	10,000	7.7	65	<10	30	56	31	<0.2	32	14.9	
USS-8	9,800	6.4	0.8	<2.0/<2.0	24	110	21	<0.2	50	20.2	
USS-9	7,700	6.3	2.3	<5.0	21	210	80	<0.2	31	17.1	
USS-10	8,200	<1.5	11	<0.2	19	42	20	<0.2	25	17.5	
USS-11	4,600	8.3	110	<5.0	33	160	860	0.27	41	19.9/21.1	
USS-12	13,000	5.4	67	28	32	29	67	<0.2	36	19.5	
USS-13	10,000	7.6	1.9	<0.4	23	33	38	<0.2	26	13.8	
USS-14	10,000	18	8.3	<2.0	160	400	200	<0.2	200	15.6	
USS-15	9,700	6.4	2.1	<2.0	23	38	55	<0.2	28	16.6	
USS-16	6,800	9.0	39	<1.0	94	850	2,000	<2.0	130	15.8	
USS-17	11,000	1.7	49	<2.0/<2.0	96	92	82	<0.2	150	15.0	

TABLE 3
(Continued)

SAMPLE I.D.	ALUMINUM	ARSENIC	ANALYTICAL PARAMETER (UNITS mg/kg)(b)							MOISTURE (%)
			CADMIUM	CHROMIUM (HEXAVALENT)	CHROMIUM (TOTAL)	COPPER	LEAD	MERCURY	NICKEL	
USS-18	10,000	8.1	12	0.6	71	55	74	<0.2	76	12.6
USS-19	10,000	8.6	8	2.0	110	9	91	<0.2	130	14.4
USS-20	9,900	9.2	9	<2.0	41	95	46	0.26	47	13.5
USS-21	11,000	5.1	29	1.1/1.0	52	36	58	0.25	49	13.1/12.5
USS-22	8,300	9.2	0.8	<5.0	52	55	97	<0.2	58	18.3
USS-23	10,000	11	400	<10	4	120	1,200	<0.2	190	22.3
USS-24	11,000	9.0	6.1	<2.0	29	29	27	0.49	29	12.7

(a) For sampling locations, refer to Figure 1.

(b) mg/kg = Milligrams per kilogram or parts per million (ppm).

(c) "<" indicated below detection limits of indicated value.

(d) Samples were analyzed in duplicate for indicated parameters.

TABLE 4
 EP TOXICITY METAL ANALYSES SUMMARY(a)
 SUBSURFACE SOIL SAMPLES(b)
 PLATING OPERATIONS BUILDING
 UNION SWITCH AND SIGNAL
 SWISSVALE, PENNSYLVANIA

SAMPLE I.D.	EP TOX METALS (UNITS mg/l)(c)				
	CADMIUM	CHROMIUM (HEXAVALENT)	CHROMIUM (TOTAL)	COPPER	NICKEL
USS-1	<0.003(d)	0.02	0.05	<0.01	0.033
USS-2	0.004	<0.01	<0.02	<0.01	0.044
USS-3	0.016/0.016(e)	<0.01/<0.01	<0.02/<0.02	<0.01/<0.02	<0.025/<0.025
USS-4	4.3	<0.01	0.03	0.4	1.8
USS-5	0.011	<0.01	<0.02	0.022	0.027
USS-6	0.015	<0.01	0.02	<0.01	<0.025
USS-7	0.22	<0.01	<0.02	<0.01	0.097
USS-8	<.003	<.01	<0.02	<0.01	0.064
USS-9	0.004	<0.01	<0.02	<0.01	0.025
USS-10	0.19	<0.01	<0.02	<0.01	<0.025
USS-11	0.18	0.02/0.02	0.04	0.011	0.052
USS-12	0.16	0.18	0.20	<0.01	0.025
USS-13	<0.003	<0.01	<0.02	<0.01	0.05
USS-14	0.096	<0.01	<0.02	0.20	0.13
USS-15	0.007	<0.01	<0.02	<0.01	0.088
USS-16	0.17	<0.01	0.05	0.17	0.15
USS-17	0.083	<0.01/<0.01	0.02	<0.01	0.05
USS-18	0.01	<0.01	<0.02	<0.01	0.11
USS-19	0.026	<0.01	0.06	<0.01	0.13
USS-20	0.074	<0.01	<0.02	0.011	0.10
USS-21	0.031	0.03	0.03	<0.01	<0.025
USS-22	<0.003/<0.003	0.02/0.04	0.04/0.05	0.08/0.08	0.046/0.05
USS-23	0.006	<0.01	<0.02	<0.01	0.23
USS-24	0.007	<0.01	0.02	<0.01	0.045

(a) Pursuant to 40 CFR 260.20 and 260.21.

(b) For sampling locations, refer to Figure 1.

(c) mg/l = Milligrams per liter or parts per million (ppm).

(d) "<" indicates below detection limit of the indicated value.

(e) Sample value was analyzed in duplicate for indicated parameters.

TABLE 5
EP TOXICITY LEAD ANALYSES SUMMARY
SUBSURFACE SOIL SAMPLES(a)
PLATING OPERATIONS BUILDING
UNION SWITCH AND SIGNAL
SWISSVALE, PENNSYLVANIA

SAMPLE I.D.	EP TOX LEAD (mg/l)(b)
USS-11	0.08/0.08(c)
USS-16	0.24
USS-23	0.18

(a)Samples with elevated total lead were analyzed for EP TOX lead.

(b)mg/l = milligrams per liter, or parts per milligram (ppm).

(c)Samples are analyzed in duplicate.

TABLE 6

CYANIDE ANALYSIS SUMMARY
SUBSURFACE SOIL SAMPLES(a)
PLATING OPERATIONS BUILDING
UNION SWITCH AND SIGNAL
SWISSVALE, PENNSYLVANIA

DEIONIZED WATER LEACHATE(b)

SAMPLE IDENFICATION	CYANIDE (mg/l)(c)	TOTAL CYANIDE (mg/kg)(d)
USS-1	<0.02(e)	2.6
USS-2	<0.02	1.7
USS-3	2.7	4.9
USS-4	0.39	4.9
USS-5	0.22	3.5
USS-6	0.15	3.8
USS-7	0.05	7.4
USS-8	0.39	4.7
USS-9	<0.02	2.3
USS-10	<0.02	<0.5
USS-11	0.39	4.6
USS-12	<0.02/<0.02(f)	<0.5
USS-13	<0.02	<0.5
USS-14	0.13	2.7
USS-15	0.03	1.9
USS-16	<0.02	3.7
USS-17	<0.02	0.7
USS-18	<0.02/<0.02	3.5
USS-19	0.02	3.6
USS-20	<0.02	2.6
USS-21	<0.02	0.8
USS-22	0.02	0.8

TABLE 6
(Continued)

DEIONIZED WATER LEACHATE(b)

SAMPLE IDENTIFICATION	CYANIDE (mg/l)(c)	TOTAL CYANIDE (mg/kg)(d)
USS-23	0.05	<0.5
USS-24	<0.02	0.5

(a)For sampling locations, refer to Figure 1.

(b)The indicated EP toxicity test method cyanide values were determined on deionized water leachates without the addition of acetic acid, pursuant to U.S. EPA Office of Solid Wastes and Emergency Response RCRA delisting detection requirements.

(c)mg/l = Milligrams per liter or parts per million (ppm).

(d)mg/kg = Milligrams per kilogram or parts per million.

(e)"<" indicates below detection limit of the indicated value.

(f)The indicated samples were analyzed in duplicate.